

REMARKS/ARGUMENTS

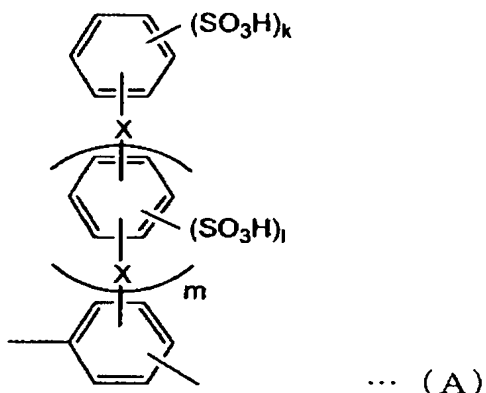
Applicants' representative would like to thank Examiner Chuo for the courteous and helpful discussion of the issues in the present application on May 4, 2007. The above amendments and following remarks summarize and further expand on the content of that discussion.

Claims 1 and 3-5 are active in this application. Claims 4 and 5 have been amended to clarify that the variable "p" mentioned therein refers to the variable "p" in both of formulae (B-1) and (B-2). This amendment is supported by the specification as originally filed.

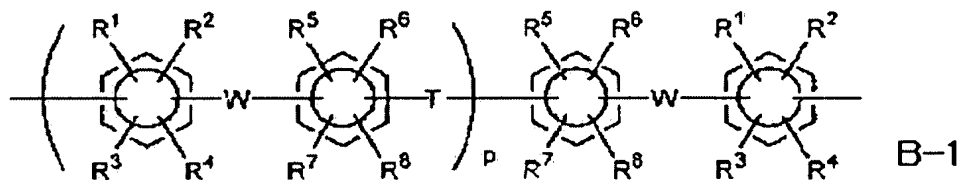
The specification has also been amended to correct an obvious typographical error at page 16. As discussed with Examiner Chuo the specification at that page is discussing the compounds of formula (B'-1), which include the (B-1) structure, with end groups R' and R'' being provided by the respective components in formula (A'). In that passage, n is recited as n=1, with several examples of the aromatic compound represented by (B'-1). However, each of those examples of the compound of (B'-1) has only 4 aromatic groups, which is not possible based upon the structure (B'-1) where n=1, but rather would require n be 0. This is the case since the formula (B'-1) where n=1 (neglecting the R' and R'' groups) would require the presence of at least 5 aromatic groups. Since each of R' and R'' are also aromatic, it is not possible for (B'-1) to have only 4 aromatic groups when n=1. However, when n=0, the structure (B'-1) (neglecting R' and R'' groups) would have only 2 aromatic groups. Since each of R' and R'' are aromatic groups, this would provide the requisite 4 aromatic groups for the compounds listed in the paragraph bridging pages 16 and 17. Thus, the error has been corrected by the present amendment and would be an obvious correction for one of ordinary skill in the art. It is noted that these particular compounds are NOT, however, included within the claims as pending in the present application, since in the present claims, the

variable "p" in (B-1) and (B-2) (which corresponds to "n" in (B'-1)) is required to be 1-80, and thus cannot be 0. No new matter has been added by these amendments.

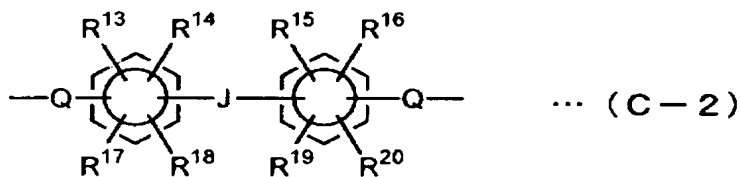
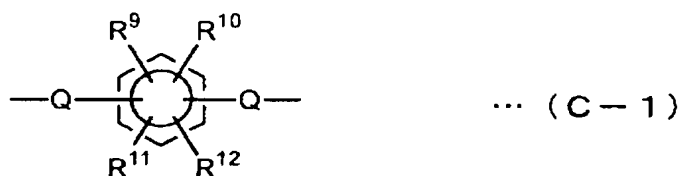
The present invention relates to a membrane-electrode assembly for a direct methanol type fuel cell. The assembly is required to comprise a negative electrode and a positive electrode assembled via a proton conductive membrane. The negative electrode is provided with a negative electrode-side separator having a mechanism for feeding a methanol aqueous solution as fuel. The positive electrode is provided with a positive electrode-side separator having a mechanism for feeding an oxidizing agent gas. Importantly, the proton conductive membrane comprises a polymer containing 0.05-99.95 mol% of a repeating constitutional unit represented by the following general formula (A):



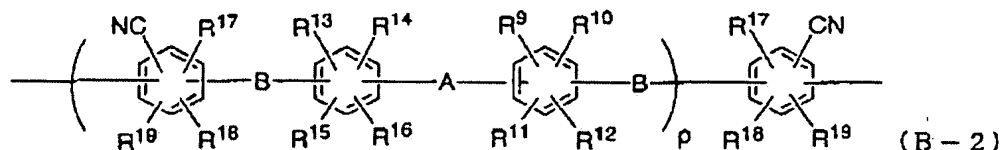
wherein X represents a single bond (–) or an electron withdrawing group or electron donating group; m represents an integer of 0-10; when m is 1-10, Xs may be the same or different; k represents an integer of 0-5; l represents an integer of 0-4; and  $(k + l) \geq 1$ , and 0.05-99.95 mol% of a repeating constitutional unit represented by the following general formula (B-1) or (B-2):



wherein  $R^1$  to  $R^8$  may be the same or different and each represents at least one atom or group selected from the group consisting of a hydrogen atom, a fluorine atom, an alkyl group, a fluorine-substituted alkyl group, an allyl group, an aryl group, and a cyano group; W represents a divalent electron withdrawing group; T represents at least one group selected from divalent groups represented by the following general formula (C-1) or (C-2):



wherein  $R^9$  to  $R^{20}$  may be the same or different and each represents at least one atom or group selected from the group consisting of a hydrogen atom, a fluorine atom, an alkyl group, a fluorine-substituted alkyl group, an allyl group, an aryl group, and a cyano group; Q represents a divalent electron donating group; and J represents at least one atom or group selected from the group consisting of an alkylene group, a fluorine-containing alkylene group, an aryl-substituted alkylene group, an alkenylene group, an alkynylene group, an arylene group, a fluorenylidene group, -O-, -S-, -CO-, -CONH-, -COO-, -SO-, and -SO<sub>2</sub>-; and p represents an integer of 1 to 80;



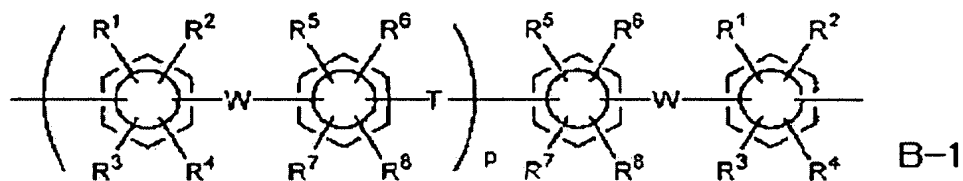
wherein  $R^9$  to  $R^{19}$  may be the same or different and each represents at least one atom or group selected from the group consisting of a hydrogen atom, a fluorine atom, an alkyl group, a fluorine-substituted alkyl group, an allyl group, an aryl group, and a cyano group; A represents a single bond or a divalent electron withdrawing group; B represents a divalent donating group; and p represents an integer of 1 to 80.

Thus, the present invention proton conductive membrane must comprise a polymer of (A) and either of (B-1) or (B-2) units.

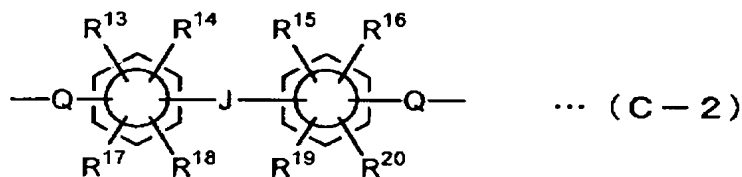
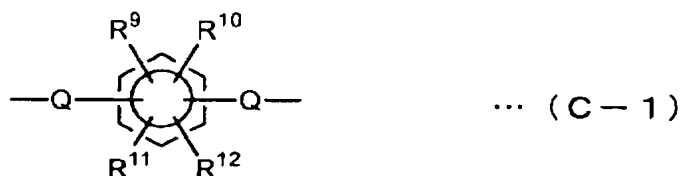
The claims stand rejected under 35 U.S.C. 112, second paragraph. This rejection has been obviated by the present amendment which clarifies that “p” in claims 4 and 5 refers to “p” in both (B-1) and (B-2).

The claims stand rejected under 35 U.S.C. 102(e) or 35 U.S.C. 103 over Asano et al. While the Examiner has stated that the claims are considered to be “product-by-process” claims, Applicants note that the present claims contain no process steps per se, and are product claims specifying the elements of the membrane-electrode assembly, and the polymer making up the proton conductive membrane.

Asano does not disclose or suggest the present invention membrane-electrode assembly, since Asano nowhere teaches either of (B-1) or (B-2) as claimed. In particular, Applicants note that (B-1) of the present invention requires a minimum of 5 aromatic rings within the structure of the formula. (B-1) is as follows:



wherein  $R^1$  to  $R^8$  may be the same or different and each represents at least one atom or group selected from the group consisting of a hydrogen atom, a fluorine atom, an alkyl group, a fluorine-substituted alkyl group, an allyl group, an aryl group, and a cyano group;  $W$  represents a divalent electron withdrawing group;  $T$  represents at least one group selected from divalent groups represented by the following general formula (C-1) or (C-2):



wherein  $R^9$  to  $R^{20}$  may be the same or different and each represents at least one atom or group selected from the group consisting of a hydrogen atom, a fluorine atom, an alkyl group, a fluorine-substituted alkyl group, an allyl group, an aryl group, and a cyano group;  $Q$  represents a divalent electron donating group; and  $J$  represents at least one atom or group selected from the group consisting of an alkylene group, a fluorine-containing alkylene group, an aryl-substituted alkylene group, an alkenylene group, an alkynylene group, an arylene group, a fluorenylidene group, -O-, -S-, -CO-, -CONH-, -COO-, -SO-, and -SO<sub>2</sub>-; and

$p$  represents an integer of 1 to 80.

Accordingly, as can be readily seen, there are 4 aromatic rings specifically drawn for (B-1). However, Applicants note that 'T' within (B-1) is required to have structure (C-1) or (C-2), thus containing either 1 or 2 additional aromatic rings. So for the case where  $p=1$ , the lowest number of aromatic rings possible in formula (B-1) is 5.

Asano, however, nowhere discloses such compounds. The Examiner has pointed to the disclosure of Asano beginning at page 10, where various compounds are listed for formula (7') of Asano. The Examiner has pointed to the compound of paragraph [0288] as being within formula (B-1). However, the compound 4,4'-bis[(4-chlorophenyl)-1,1,1,3,3,3-hexafluoropropyl]diphenyl ether only has 4 aromatic rings (2 from the bis(chlorophenyl) substituents and 2 from the diphenyl ether portion). A further examination of all of the compounds disclosed for formula (7') of Asano reveals that the compounds range from 1-4 aromatic groups only, with no suggestion of having more. Accordingly, Asano cannot anticipate formula (B-1) of the present invention, and provides no teaching or suggestion to modify their compounds to make them have further aromatic rings.

With respect to (B-2) (which Applicants note that the Examiner has not asserted being taught by Asano), Applicants note that the various compounds taught by Asano do not suggest the nitrile substituted polyaromatic compound of formula (B-2) of the present invention. None of the compounds or proposed substituents of Asano disclose or suggest nitrile substituents, which the Examiner appears to acknowledge by non-comment.

Accordingly, since the present invention requires at least one of (B-1) or (B-2) to be present in an amount of from 0.05-99.95 mol% of the repeating constitutional units of the proton conductive polymer making up the present invention membrane, and Asano nowhere discloses or teaches such constitutional units, Asano cannot anticipate the present invention, nor render it obvious. As such, the rejection should be withdrawn.

Application No. 10/849,182

Reply to Office Action of February 8, 2007

Applicants submit that the application is now in condition for allowance and early notification of such action is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.  
Norman F. Oblon

A handwritten signature in black ink, appearing to read "J. Derek Mason", is written over a horizontal line.

J. Derek Mason  
Attorney of Record  
Registration No. 35,270

Customer Number

**22850**

Tel: (703) 413-3000

Fax: (703) 413 -2220

(OSMMN 06/04)